

Amendments to the Claims:

This listing of the claims will replace all prior versions and listing of claims in the application:

Claim 1(currently amended): A microfluidic device, comprising:

- (a) at least one channel for conducting a fluid, said channel having an internal channel surface formed in a substrate;
- (b) a first polymer attached to the channel surface through photoinitiated grafting of a first monomer to selected regions of the channel surface; ~~and~~
- (c) a porous polymer monolith, ~~comprised of~~ comprising a second monomer, ~~in said channel, and~~ attached to said first polymer in the selected regions in said channel through photoinitiated grafting thereby bonding the monolith to the channel surface, wherein the first and second monomers may be the same or different; and
- (d) a polymer chain comprising a third monomer having a functional group, wherein said polymer chain is attached to a portion of the porous polymer monolith by photoinitiated grafting of said third monomer, wherein the third monomer is different from the second monomer.

Claim 2(original): The device of claim 1 wherein said substrate is thermoplastic and transparent to light in the wavelength range of 200 to 350 nm.

Claim 3(previously presented): The device of claim 2 wherein the thermoplastic substrate is selected from the group consisting of poly(methyl methacrylate), poly(butyl methacrylate), poly(dimethylsiloxane), polyolefin, cyclic olefin copolymer, polyethylene, polypropylene, poly(ethylene terephthalate), poly(butylene terephthalate), polyimide and hydrogenated polystyrene.

Claim 4(original): The device of claim 1 wherein said thermoplastic substrate is a polyolefin.

Claim 5(original): The device of claim 4 wherein the thermoplastic substrate polyolefin is cyclic olefin copolymer.

Claim 6(original): The device of claim 1 wherein the substrate is selected from the group consisting of PS-H, COC and PP.

Claim 7(original): The device of claim 1 wherein the channel is 10-200 μm deep.

Claim 8(original): The device of claim 1 wherein the first polymer attached to the channel surface for grafting is comprised of one or more monomers selected from the group consisting of a polyvinyl monomer, a monovinyl monomer, and a mixture of a polyvinyl and monovinyl monomer.

Claim 9(currently amended): The device of claim 8 wherein said one or more monomer is a monovinyl monomer which is selected from the group consisting of acrylic acids, methacrylic acids, acrylamides, methacrylamide alkyl derivatives of methacrylamide, alkyl derivatives of acrylamide, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates and hydroxyalkyl methacrylates, wherein the alkyl group in each of the aforementioned alkyl monomers has 1-10 carbon atoms, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, vinylazlactones, and acrylate and methacrylate derivatives including primary, secondary, tertiary, and quaternary amine functionalities and zwitterionic functionalities.

Claim 10(previously presented): The device of claim 8 wherein said one or more monomer is a polyvinyl monomer which is selected from the group consisting of alkylene diacrylates, alkyl dimethacrylates alkylene diacrylamides, alkylene dimethacrylamides, hydroxyalkylene diacrylates, hydroxyalkylene dimethacrylates, wherein the alkylene group in each of the aforementioned alkylene monomers consists of 1-6 carbon atoms, oligoethylene glycol diacrylates, oligoethylene glycol dimethacrylates, vinyl esters of polycarboxylic acids, divinyl ethers, pentaerythritol di-, tri-, or tetramethacrylates, pentaerythritol di-, tri-, or tetraacrylates, trimethylopropane trimethacrylates, trimethylopropane acrylates, alkylene bis acrylamides and alkylene methacrylamides.

Claim 11(original): The device of claim 1 wherein the first polymer attached to the channel surface for grafting is comprised of at least one monomer selected from the group consisting of AAm, BuA, AMPS, EDA, EDMA, MMA and MA.

Claim 12(previously presented): The device of claim 1 wherein the porous polymer monolith is comprised of one or more polymerized monomers selected from the group consisting of polyvinyl monomers or a mixture of polyvinyl and monovinyl monomers.

Claim 13(previously presented): The device of claim 12 wherein said one or more monomer for the monolith is a polyvinyl monomer which is selected from the group consisting of alkylene diacrylates, alkylene dimethacrylates, hydroxyalkylene diacrylates, hydroxyalkylene dimethacrylates, alkylene bisacrylamides, alkylene bismethacrylamides, wherein the alkylene group each of the aforementioned alkylene monomers has 1-6 carbon atoms, oligoethylene glycol diacrylates, oligoethylene dimethacrylates, diallyl esters of polycarboxylic acids, divinyl ethers, pentaerythritol di-, tri-, or tetraacrylates, pentaerythritol di-, tri-, or tetra methacrylates, trimethylopropane triacrylates and trimethylopropane trimethacrylates.

Claim 14(previously presented): The device of claim 12 wherein said one or more monomer for the monolith is a monovinyl monomer which is selected from the group consisting of acrylic acids, methacrylic acids, acrylamides, methacrylamide alkyl derivatives of methacrylamide, alkyl derivatives of acrylamide, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates and hydroxyalkyl methacrylates, wherein the alkyl group in each of the aforementioned alkyl monomers has 1-10 carbon atoms, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, vinylazlactones, and acrylate and methacrylate derivatives including primary, secondary, tertiary, and quarternary amine functionalities and zwitterionic functionalities.

Claim 15(original): The device of claim 2 wherein the porous polymer monolith is comprised of a mixture of monomers selected from the group consisting of HEMA, EDMA and BuMA.

Claim 16(cancelled).

Claim 17(currently amended): The device of claim 16 wherein the third monomer bearing the functional group is selected from the group consisting of: acrylic acids, methacrylic acids, acrylamides, methacrylamides, alkyl acrylamides, alkyl methacrylamides, alkyl acrylates, alkyl methacrylates, perfluorinated alkyl acrylates, perfluorinated alkyl methacrylates, hydroxyalkyl acrylates, hydroxyalkyl methacrylates, wherein the alkyl group each of the aforementioned alkyl monomers has 1-10 carbon atoms, vinylazlactones, oligoethyleneoxide acrylates, oligoethyleneoxide methacrylates, and acrylate and methacrylate derivatives wherein the derivatives comprise a primary, secondary, tertiary or quarternary amine or a zwitterion.

Claim 18(original): The device of claim 16 wherein the third monomer bearing the functional group is selected from the group consisting of: methyl acrylate, methyl methacrylate, butyl acrylate, butyl methacrylate, *tert*-butyl acrylate, *tert*-butyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxyethyl methacrylate, acrylic acid, methacrylic acid, glycidyl acrylate, glycidyl methacrylate, 3-sulfopropyl acrylate, 3-sulfopropyl methacrylate, pentafluorophenyl acrylate, pentafluorophenyl methacrylate, 2,2,3,3,4,4,4-heptafluorobutyl acrylate, 2,2,3,3,4,4,4-heptafluorobutyl methacrylate, 1H,1H-perfluorooctyl acrylate, 1H,1H-perfluorooctyl methacrylate, acrylamide, methacrylamide, N-ethylacrylamide, N-isopropylacrylamide, N-[3-(dimethylamino)propyl] methacrylamide, 2-acrylamido-2-methyl-1-propanesulfonic acid, 2-acrylamidoglycolic acid, [2-(methacryloyloxy)ethyl]-trimethylammonium chloride, [2-(methacryloyloxy)ethyl]dimethyl(3-sulfopropyl)ammonium hydroxide, and 2-vinyl-4,4-dimethyl-azlactone.

Claim 19(original): The device of claim 16 wherein the third monomer is selected from the group consisting of AMPS, BuA and VAL.

Claim 20(currently amended): A microfluidic device, comprising:

- (a) at least one channel for conducting a fluid, said channel having an internal channel surface formed in a substrate comprising a polyolefin;
- (b) a first polymer, comprised of a first polyvinyl monomer, attached to the channel surface through photoinitiated grafting ~~of~~ to selected regions of the channel surface; and
- (c) a porous polymer monolith, comprised of a second polyvinyl monomer, ~~in said channel, and~~ attached to said first polymer in the selected regions in said channel through photoinitiated grafting thereby bonding the monolith to the channel surface, wherein the first and second monomers may be the same or different; and
- (d) a polymer chain having a functional group attached to a portion of the porous polymer monolith by photoinitiated grafting of a third monomer, wherein the third monomer is different from the second monomer.

Claim 21(cancelled).

Claim 22(original): The device of claim ~~21~~20 wherein the third monomer is an acrylate.

Claims 23-46 (cancelled).